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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,969	01/21/2004	Chok W. Ho	LAM1P152D1/P0692D	6351
22434	7590	12/09/2005	EXAMINER	
BEYER WEAVER & THOMAS LLP			VINH. LAN	
P.O. BOX 70250			ART UNIT	
OAKLAND, CA 94612-0250			PAPER NUMBER	

1765

DATE MAILED: 12/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/762,969	HO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Lan Vinh	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 17, 18 and 20-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17, 18, 20-22, 29-31, 36 and 37 is/are rejected.
- 7) ☒ Claim(s) 23-28 and 32-35 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>12104</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment/Argument***

1. Applicant's arguments, see pages 7-8 of the response, filed 9/29/2005, with respect to the rejection(s) of claim(s) 17-18, 20, 22, 23, 25, 29, 30-36 under 35 USC 102(e) based on the Hu (US 6,316,354) reference have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Hu (US 6,316,354). A discussion of the rejection follows.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims 17-18, 20-22, 29-31, 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Hu (US 6,316,354)

Hu discloses a method for forming an integrated circuit formed from a low-k dielectric over a substrate. The method comprises the steps of:

placing a hard mask 20 over the silicon oxide/organic low-k dielectric layer 14 (col 4, lines 1-2)

forming a patterned photoresist layer 30 over the hard mask 20 (col 4, lines 26-28, fig. 1)

placing the wafer/substrate in an etching chamber (col 5, lines 58-60)  
flowing an etchant gas comprising NH<sub>3</sub> (col 5, lines 60-63), Hu discloses that the NH<sub>3</sub> has a flow rate of 400 sccm (col 5, lines 60-62), which overlaps the claimed range of 5-1500 sccm

generating a plasma from NH<sub>3</sub> to strip resist (col 5, lines 1-10, fig. 4)  
selectively etching the layer 14/organic low-k dielectric layer with respect to the hard mask 20 (col 4, lines 17-25, fig. 2 shows that portion of layer 14 removed during etching is larger than portion of hardmask layer 20 removed during etching)

removing the photoresist 30 when exposing the substrate to the NH<sub>3</sub> plasma (col 4, lines 45-52, fig. 2), which reads on simultaneously stripping the photoresist layer during selective etching of the low k dielectric layer

Since Hu discloses the same method using the same structure and materials (low-k dielectric, hardmask, NH<sub>3</sub> gas) as the claimed invention, under the principle of inherency, Hu plasma from NH<sub>3</sub> would have inherently been capable to selectively etch the organic low-k dielectric layer with respect to the hardmask. It is also noted that "where functional language is used in the process, the burden shifts to the applicant to establish that the reference does not inherently function in the manner required by the claims. Ex parte Bylund 217 USPQ 492 (PO BdPatApp 1981)"

The limitations of claims 18, 20, 30 have been discussed above

Regarding claim 21, Hu discloses keeping the temperature of the low-k dielectric on the substrate at below about 40<sup>0</sup> C (col 5, lines 20-22)

Regarding claims 22, Hu discloses applying power from about 100 Watts to the chamber (col 4, lines 64-65)

Regarding claims 29, 36, fig. 2 shows that the resist 30 is completely removed after the etching step

4. Claim 37 is rejected under 35 U.S.C. 102(e) as being anticipated by Hu (US 6,316,354)

Hu discloses a method for forming an integrated circuit formed from a low-k dielectric over a substrate. The method comprises the steps of:

placing a hard mask 20 over the silicon oxide/organic low-k dielectric layer 14 (col 4, lines 1-2)

placing the wafer/substrate in an etching chamber (col 5, lines 58-60)

flowing an etchant gas comprising NH<sub>3</sub> (col 5, lines 60-63), Hu discloses that the NH<sub>3</sub> has a flow rate of 400 sccm ( col 5, lines 60-62), which overlaps the claimed range of 300-800 sccm

generating a plasma from NH<sub>3</sub> (col 5, lines 10-15, fig. 4)

keeping the temperature of the low-k dielectric on the substrate at below about 40<sup>0</sup> C (col 5, lines 20-22)

Since Hu discloses the same method using the same structure, temperature and materials (organic dielectric, hardmask, NH<sub>3</sub> gas) as the claimed invention, under the

principle of inherency, Hu plasma from NH<sub>3</sub> would have inherently etched the organic dielectric layer. It is also noted that "where functional language is used in the process, the burden shifts to the applicant to establish that the reference does not inherently function in the manner required by the claims. Ex parte Bylund 217 USPQ 492 (PO BdPatApp 1981)"

***Allowable Subject Matter***

5. Claims 23-28, 32-35 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 23, the cited prior art of record fails to disclose an integrated circuit formed from the step of "placing an etch stop....; placing a second organic dielectric ....hardmask.", in combination with the rest of the limitations of claim 23

Regarding claim 32, the cited prior art of record fails to disclose an integrated circuit formed from the method comprises the step of "providing CHF<sub>3</sub> while providing the etching gas comprising NH<sub>3</sub>", in combination with the rest of the limitations of claim 32

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chung et al (US 6,184,142) discloses using a low-k organic silicon oxide film (col 1, lines 56-57)

***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV  
December 6, 2005